CLAIMS

What is claimed is:

1. An image processing system comprising:

a filter selection mechanism for receiving an input pixel window and responsive thereto for generating a filter identifier based on one of an edge parameter computed based on the input pixel window and an activity metric computed based on the input pixel window; and

a filter application unit coupled to the filter selection mechanism for receiving the filter identifier and applying a filter identified by the filter identifier to the input pixel window to generate an output pixel.

2. The image processing system of claim 1 further comprising:

an edge parameter evaluation unit for computing at least one edge parameter based on the input pixel window.

3. The image processing system of claim 2 wherein the edge parameter is one of edge angle, edge sharpness, edge curvature, and any measurable unit related to an edge.

4. The image processing system of claim 1 further comprising:

an activity metric evaluation unit for computing at least one activity metric based on the input pixel window.

5. The image processing system of claim 4 wherein the activity metric is one of a level of variation of a red color plane, a level of variation of a green color plane, a level of variation of a blue color plane, a level of variation of a luminance plane, a mean absolute deviation of a red color plane, a mean absolute deviation of

a green color plane, a mean absolute deviation of a blue color plane, and a mean absolute deviation of a luminance plane.

6. The image processing system of claim 1 wherein the filter application unit includes a filter repository for providing a plurality of filters for use by the filter application unit.

7. The image processing system of claim 6 wherein the filter repository includes one of a blurring filter, a smoothing filter, a sharpening filter, and an enhancement filter.

8. A method for processing a digital image having a plurality of input pixels comprising:

for each input pixel

receiving an input pixel window corresponding to the current input pixel;

generating a filter identifier based on one of an edge parameter and an activity metric; and

applying a filter specified by the filter identifier to the input pixel window to generate an output pixel corresponding to the current input pixel.

9. The method of claim 8 wherein the step of receiving an input pixel window corresponding to the current input pixel includes the step of:

receiving an input pixel window that includes a current input pixel and pixels adjacent to the current input pixel.

10. The method of claim 8 wherein the step of receiving an input pixel window corresponding to the current input pixel includes the step of:

receiving an input pixel window that includes a N x N square of pixels centered about the current input pixel.

11. The method of claim 8 wherein the step of generating a filter identifier based on one of an edge parameter and an activity metric includes the steps of:

computing at least one edge parameter based on the input pixel window; and

utilizing the edge parameter to generate the filter identifier.

12. The method of claim 11 wherein the step of computing at least one edge parameter based on the input pixel window includes the step of:

computing one of an edge angle, edge sharpness, edge curvature, and any measurable unit related to an edge.

13. The method of claim 8 wherein the step of generating a filter identifier based on one of an edge parameter and an activity metric includes the step of

computing an activity metric based on the input pixel window; and

using the activity metric to generate the filter identifier.

14. The method of claim 13 wherein the step of computing an activity metric based on the input pixel window includes the steps of:

computing one of a level of variation of a red color plane, a level of variation of a green color plane, a level of variation of a blue color plane, a level of variation of a luminance plane, a mean absolute deviation of a red color plane, a mean absolute deviation of a green color plane, a mean absolute deviation of a blue color plane, and a mean absolute deviation of a luminance plane.

15. A method for processing a digital image having a plurality of input pixels comprising:

receiving the digital image;

for each input pixel

generating a level of activity based on a first window of pixels with reference to the input pixel;

determining whether the level of variation is in a predetermined relationship with a predetermined level of variation;

when the level of variation is in a predetermined relationship with a predetermined level of variation, applying a first filter; and

when the level of variation is not in a predetermined relationship with a predetermined level of variation, generating a measure of an edge parameter based on a second window of pixels with reference to the input pixel, selecting an enhancement filter based on the measure of edge angle, and applying the selected enhancement filter to a third window to generate an output pixel corresponding to the current input pixel.

16. The method of claim 15 wherein the second window includes a neighborhood of pixels that includes the current input pixel.

17. The method of claim 15 wherein the first filter is a low pass filter that replaces the current input pixel with a blurred version of the current input pixel.

18. The method of claim 15

wherein the step of generating a level of activity based on a first window of pixels with reference to the input pixel includes

determining a mean absolute deviation (MAD) for color planes based on a first window of pixels; wherein the first window includes the input pixel;

wherein the step of determining whether the level of variation is in a predetermined relationship with a predetermined level of variation includes

comparing the MAD with a predetermined threshold;

wherein the step of when the level of variation is in a predetermined relationship with a predetermined level of variation, applying a first filter includes

when the MAD is less than the predetermined threshold, applying a low pass filter to the input pixel to generate an output pixel;

wherein the step of when the level of variation is not in a predetermined relationship with a predetermined level of variation, generating a measure of edge angle based on a second window of pixels with reference to the input pixel, selecting an enhancement filter based on the measure of edge angle, and applying the selected enhancement filter to a third window to generate an output pixel corresponding to the current input pixel includes

when the MAD is not less than the predetermined threshold, selectively applying to a third window of pixels one set of filter coefficients selected from a group of sets of enhancement filter coefficients based on at least one edge parameter computed from the second window of pixels to generate an output pixel.

19. The method of claim 15 wherein the step of generating a measure of an edge parameter based on a second window of pixels with reference to the input pixel includes the step of:

computing one of an edge angle, edge sharpness, edge curvature, and any measurable unit related to an edge.

20. The method of claim 15 wherein the first window, the second window, and the third window are the same window of pixels.